INDIAN STATISTICS

A Critical Study

by

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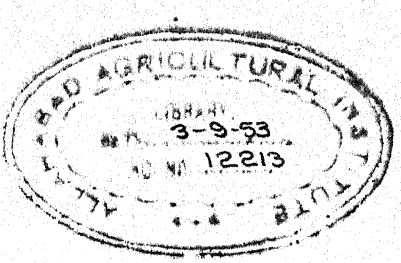
PRAKASH BROTHERS AGRA

Printed and published by the C.M.S. Press,
Sikandra, Agra.



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CHAPTER I

Vital Statistics

The importance of vital statistics is seldom appreciated by the man in the street even during the modern times; in spite of this it is very necessary for the sake of public health that we should have records of the number of people, the births and deaths. Vital statistics are useful for many purposes as is also indicated by the following words of Whipple.

"To the sanitarian they measure the peoples' health and reflect the hygienic conditions of the environment; to the economist they indicate the number and distribution of the producers and consumers of wealth; to the historian they show the nation's growth and mark the flood and ebb of physical life."

Populations are enumerated or numbered at regular intervals by taking a census while satisfactory statistics of deaths and births can only be obtained by compulsory registration.

The Census:

The census of population is taken every tenth year in India [The last census was taken on 1st of March 1941]. Some time before the date fixed for the census a Census Commissioner is appointed who is the sole in-

charge of the Census Report. He selects Superintendents of Census for each province or state. The Superintendents select honorary Census Supervisors and Enumerators for each district or locality. In the towns enumeration is done through municipal authorities while in the rural areas through the Tehsildars and Quanungos. Each enumerator is given a block in a town or a locality. He visits every house in his block sometime before the Census day and collects the required information from the head of the family by the help of questions and cross-questions. The work of these enumerators is supervised by the District Supervisors. The collected data is passed on to the Superintendent of Census where it is scrutinized, classified and tabulated to give the final Census Report which is published. These reports give useful information regarding the distribution and the density of population, vital statistics, urban and rural population, age and sex distribution, civil condition, literacy, occupation, infirmities etc.

The one night enumeration which was adopted upto the census of 1931 was in 1941 replaced by a period system which enabled the number of enumerators to be halved as against the number employed in 1931. Schedules used formerly were abandoned and instead of this enumeration was carried out directly on ordinary slips of paper, which were afterwards sorted out to give tables. A new feature of the last census was the taking of 1/50 random samples of the entire population to be used for making several deductions. Data was collected on the basis of community and not on religion. Some such new questions as the age of mothers at the birth of their first child and the number of children born were introduced. Returns of such questions are expected to help in the calculation of the net production rate of the country.

Various defects are noticed in the census reports

and they require a lot of improvement as yet. In the report no distinction is made between industrial workers and other artisans carrying on their private enterprise. It does not give the part of year during which a worker remains employed and the part when he is unemployed. Many types of diseases are not correctly reported due to the fact that the sufferers of these diseases [like syphilis, gonorrhea etc.] try to hide them from everybody. However the greatest amount of inaccuracy is to be noticed in the age-returns for the following reasons:—

(a) The informants being uneducated are sometimes ignorant of their ages.

(b) The age period of unmarried girls from 10 years to 20 years is defective due to the reasons that people are unwilling to admit that they have unmarried daughters, who should have naturally been married according to the customs of the country.

(c) The widowers and bachelors have a tendency to give their age less than what it is since they always keep in mind the chance of their marriage for which they do not want to appear to be over age.

(d) Married girls having children and old people have a tendency to over-estimate their ages.

(e) Old people have an inclination towards giving age in round numbers like 50, 60 etc. rather than accurate age as 59 or 62 years.

Besides these the complexity of the blank forms, lack of education of the enumerators and non-seriousness of the supervisors lead to grave fallacies in the Census Reports. Accuracy of the Census Reports depends to a large extent on the cleverness and capability of the enumerators and also on the general circumstances prevailing in the country at the time when the Census is being

conducted. Unless the enumerator is given adequate training, he cannot be expected to carry on his work accurately. Even during the last census the enumerators who were appointed to carry on the work were not properly trained; in most cases they were not able to fill even the blank forms correctly; they did not exactly understand the significance of the headings and sub-headings of the forms which they were expected to fill. In almost all cases they lacked tact which is so very essential for extracting information from the reluctant or indifferent informants. The remedy of this lies in having a permanent staff of some experienced and trained persons and in collecting the information with the co-operation of the universities and colleges of the country.

Further the following suggestions which were given by Dr. Bowley as early as 1934, should without delay be followed:—

(1) The population Census ought to be tabulated by machines. This will mean less time for sorting and tabulating than if the same work is done by hand; another advantage is that all details are preserved for future use.

(2) The comparability with earlier censuses should be preserved, even at the expense of some duplication of tabulation.

(3) Essential information for each village should be made available in a booklet for each district.

Improvements on the above lines are necessary because the Census has great potentialities. Undoubtedly, the Census is meant primarily for administrative purposes but it also gives a lot of information which can easily be utilised by the economists, the sociologists, the philanthropists and the business men.

Population.

The actual population of a district is known only

for the years in which a census in taken. Since the census is taken in India every tenth year, we know the population for the years 1941, 1931 etc. For various purposes it is essential to estimate the population in the individual intercensal and extracensal years. These estimates are made by one of the following methods:—

1. Arithmetic average method:—In this it is assumed that the increase in population from one census year i.e. 1931 to the next census year i.e. 1941 is in arithmetic progression. An easy mathematical formula at once gives the population for any year between 1931 to 1941. The method has the advantage that it is extremely simple but it suffers from the handicap that it does not give very good estimates of the population.

2. Geometric average method:—Since population begets population it appears more reasonable and accurate to apply a method parallel to the compound interest one in which it is assumed that interest begets interest. Thus it appears more accurate to assume that the population increases in geometric progression. In this case also a simple formula can be developed on mathematical principles to obtain the population for any intercensal year. However, in actual calculation it is necessary to take help from logarithmic tables and hence the method cannot claim to be as simple as that depending on arithmetic progression.

3. By the help of birth and death rates:—It might be easily seen that the natural increase, that is, the excess of births over deaths, would give an estimate of population. This would be an ideal method if we knew also the amount of emigration and immigration. As this information is never available in the case of districts or even province

we have to depend on the estimates obtained by one or the other of the foregoing methods. However this method can be used as a check on the estimates obtained. In the case of the estimates of the population of a country this method is the best to be used since the amount of emigration and immigration is known. As is obvious this method gives better approximation than the previous two methods.

4. From Life Table:-It is possible to make a good estimate of the growth of population by the use of the Life Tables given in the Actuarial Report in the census. The tables do not depend on the records of death, but on the study of the figures of the censuses. By applying the Life Table to the numbers in the 1941 census it can be estimated how much at each age will survive for 1,2..... 10 or more years. Thus the population of 1951 even can be forecasted apart from migration. The assumption made is that the rate of survival in 1931 to 1941 is repeated in the following decade. This method must be used if not for getting population, at least as a check on the other method.

Birth-rate

The birth rate is expressed as the number of births in a year per thousand of the population living at the middle of that year. This is crude birth rate and measures the extent in which the population is reproducing itself. However it does not give a good measure for comparing fertility in different places. Since the number of births depends upon the number of women of childbearing ages, a better method is to calculate the number of births per thousand married women at reproductive ages i. e. from 13-48 years. In any case the

best method is that which takes into account the number of married women in the particular age groups; or better still if we calculate the standardised birth rate.

Standardised death-rate

A little consideration will indicate that the rates of mortality in age groups are generally highest in childhood and old age; and also for all age groups the mortality amongst males is greater than that amongst females. Thus it is clear that if the crude death rate of one town or district is greater than that of another, it may be due to one or more of the following reasons:-

(*a*) In the first town or district the population may consist of a greater proportion of children or aged persons.

(*b*) In the first town or district there may be a greater proportion of males in the population.

(*c*) The sanitary conditions of the first town or district may be better than that of the second.

Thus the crude death rate, since it is influenced by other factors besides sanitary conditions, is an imperfect measure for comparing sanitary conditions in various towns or districts. It cannot even be used as a measure of the hygienic conditions of a particular town or district over a series of the years because it may lead to wrong conclusions. The reason for it lies in the fact that a change in crude death-rate may be due to the alteration in the age constitution of the population and not due to any improvements in the local conditions.

In order that the crude death-rate may be used for comparative purposes we must first eliminate the effect due to the age and sex constitution of a population. A death rate calculated after giving allowance for age and sex constitution can be used as a sanitary index. In statistical language the death-rate must be standardised.

For this purpose the *Direct Method* which requires

a knowledge of the rates of mortality for different age groups for each sex, is generally employed in preference to the *Indirect Method,* where only the population, in different age groups and the crude death rate of the town or district are known. In the Direct Method a standard population is first selected [sometimes the population of the whole country is taken as standard population at other times any arbitrary number say 1 million, 1 crore etc is taken as the standard population]. This population is so arranged that its age distribution for males and females corresponds exactly with the age distribution of the mortality in the town or the district for which the standardised death-rate is required. Against each age group is written the death-rate for that age group. The figures of the standard population for each age group give the weight for the different age groups. The standardised death rate is obtained by finding the weighted arithmetic average of the death rate for different age groups. This is done by multiplying the death rate of an age group by the corresponding weight i. e. the population for that age group in the standard population. The products so obtained are added and this sum is divided by the total number representing the standard population. The figure so obtained gives the standardised death rate Such standardised death rates are calculated for males and females separately. From these the standardised death rate for persons (not only males or females) of the town or the district is easily obtained by calculating the weighted arithmetic average from the two death rates for males and females taking the weights as the total male and female populations in the standard population.

This figure gives the standardised death rate of persons in a town or district. Similarly the standardised death rates for other towns or districts may be calculated and thus we get a basis for the comparison of the sanitary conditions of different towns or districts.

CHAPTER II

Agricultural Statistics.

It is extremely necessary to organise a new system on an all India basis for recording the area under crops and the yield in the areas under Permanent Settlements. The inaccuracy which creeps in this data for India has a very serious effect on the estimates for the world production published by the International Agricultural Institute, Rome and also on the relative importance of India as a food producing country. Due to this faulty data it is impossible to determine if the food is increasing in proportion to population.

Now we will examine some of the shortcomings of agricultural Statistics. As we know, agricultural statistics, like most of the statistics in India, is collected by Government servants (Patwaris, Quanungoes etc) under official supervision. Thus we can include it under the so called 'official statistics'. Consequently agricultural statistics will have all the shortcomings of Official Statistics in India. Now we will deal with the shortcomings of Official Statistics in India.

Such Statistics of India, in general, is said to have two very serious defects. In the first place, the agency for the collection of primary data is hardly trustworthy. For example, the collection of Agricultural statistics and

prices is carried on by the least (statistically) qualified men in the revenue department of the provincial Governments. The second is that the scientific methods are generally not applied to the analysis of the primary data. Due to these two defects the accuracy of the Official Statistics in this country has been questioned by many.

Regarding the nature of such statistical data in India Bowley-Robertson committee has given a detailed and critical discussion. It speaks for itself. They write.*

"The Statistics of India have largely originated as a bye-product of administrative activities, such as the collection of land revenues, or from the need of information relating to emergencies. Only in the case of the Population Census and to some extent of foreign trade has there been an organisation whose primary duty is the collection of information. As a result the Statistics are uncoordinated and issued in various forms by separate Departments. Though in some branches careful work is being done, and determined efforts made to improve the accuracy and scope of information, in others they are unnecessarily diffuse, gravely inexact, incomplete or misleading; while in many important fields general information is almost completely absent."

Besides this another shortcoming of the Official Statistics in India is that the exact significance, scope and method of their compilation are not widely known. The statistics are published in mere sketchy tables which give no explanation of unit etc and thus it is not possible for any research worker to use them as secondary data generally. Sometimes even this data is published so late that it becomes out of date at once and consequently there is no question of it being used. However, when this data is used, it should be done so only after careful

*Refer Page 1 of "A scheme for an Economic Census of India" Report by Dr. A H. Bowley and Mr. D. H. Robertson.

examination. A little effort and careful observation may sometimes show that these are figures or estimates taken from different sources for the same object, which widely differ in reliability and should therefore be rejected. Very frequently individuals or firms are not willing to give what they consider to be their trade secrets. Difficulties of this nature do arise; they are sometimes insurmountable. It is for these reasons that reliance cannot sometimes be placed even on those figures which are published by the Government. It is true that the Government can use compulsion in obtaining information and this certainly overcomes one difficulty namely the negligence on the part of the informant, but adds another stumbling stone in the way of getting truthful answers. Compulsion, in almost all cases, drives the informant sometimes to assume a hostile attitude which leads to partisan answers and suppression of a part of the facts or to give biased information. It is right that the Government have better means of undertaking an extensive enquiry than those which are at the disposal of the private or personal investigators; but can the Government successfully overcome the obstacles which have hardly any remedy? As for example, the questions relating to the use of intoxicants, bodily disability and mental infirmity which are likely to be offensive, must arouse resentment and unwillingness to give answers no matter who conducts the enquiry, a private individual or the Government; questions pertaining to incomes of the informants cannot but provoke antagonism, since they are generally considered as matters of private concern and not of public query and so whenever such a question is put to anybody, he gives biased information since the apprehension of the imposition of large income tax is always in the informant's mind; as they always think, inspite of assurances given to them by the investigator, that the information is wanted only for that purpose.

The above criticism applies to all official statistics including the agricultural statistics. Besides these general weaknesses there are other special shortcomings of the agricultural statistics in India, which we shall discuss now.

The difficult task of preparing primary estimates of agricultural statistics falls on the officers of the Provincial Revenue Department, who have to carry it out amidst their heavy administrative and revenue collecting duties. They have neither the time nor the necessary statistical training for the work entrusted to them. This is one of the reasons why the crop statistics in the provinces is of a doubtful character.

Besides this, the method of collection of agricultural statistics indicates that for the primary collection in the initial stage the village accountant is mostly responsible. Those who know village conditions intimately can understand how easily and very often the village accountant, whose salary is very low, is won over by the villagers to give a biassed report in favour of the cultivator. Further, the inherent idleness of the human nature is responsible towards his (village accountant's) inclination and habit of reporting no change from the previous year. He has a habit of exaggerating the fall in the case of a bad crop and of underestimating a good crop since the farmers generally manipulate matters so that they get his sympathies He has a tendency towards reporting an average crop even when the yield is very moderate. Then again the local officials do not take the trouble of checking these reports by first hand work but they simply deduce the area in many cases from the quantity of the seed the cultivator says he has sown.

Regarding the total area under different crops, the Temporary Settlement areas, where ryotwari system is found, have been very carefully surveyed and mapped.

The village accountant or Patwari keeps the field records. At the beginning of the sowing period he prepares a statement showing areas under different crops in the village or villages under him and submits it to the Revenue inspector. These figures are aggregated in Tehsils, districts and finally in the provinces Dr. Sukhatme* gives his views regarding such statistics in the following words:—

"In the temporarily settled parts an elaborate revenue agency is maintained..... Every Patwari is required to make a field-to-field inspection of the villages under his charge in the ordinary course of his duties and there is adequate senior staff to supervise his work. The statistics of cultivated area under the different crops in the temporary settled parts is, therefore, accurate."

Now, coming to the yield statistics let us see how this is estimated. The yield per acre in any year is found out by multiplying the normal yield per acre by the condition factor of the crop in the year in question. The condition factor is estimated by the village accountant. Once or more during the growing season and finally at harvest time, he estimates his yield taking annas as his unit. [Generally the standard yield considered by him lies somewhere between 12 and 16 annas]. This estimate he reports to the Tehsildar, who guided by the general knowledge of the condition of the crop, reports a single result for all the villages under him to the District Officer. The latter in his turn modifies the figures exercising his discretion in the matter and reports an average for the district. From this the average yield for the year is calculated.

For example if the standard yield is expressed as 13 annas and the average estimate as given by the district officer is 7 annas then $\frac{7}{13}$ is the condition factor. This number when multiplied with the normal yield per acre

*Refer Page 926 of Commerce Annual Review Number, December 1945 [First Column]

will give the average yield in the year under consideration Regarding this average estimate Dr. Bowley writes.*

"The average which the Tehsildar or the District Officer should take of the numbers submitted to him is very vaguely defined. It is probable that he does not attempt to take an arithmetical average, but simply chooses that which is given most frequently (technically the mode) or ignores the figures and gives a number on his own judgment."

Regarding the defects in the normal yield estimation Dr. Sukhatme writes†

"Normal yield is defined as the yield per acre of land of average quality averaged out over a number of years and is supposed to be derived from crop-cutting experiments made over a number of years. These experiments are, however, carried out on plots selected by eye examination. There is no objective procedure laid down for the choice of these plots. The choice is left to be made by the agricultural Officers and the revenue inspectors in accordance with their personal notions of averages. This gives a biassed character to the estimate of outturn and vitiates the forecast of the crop. In experiments intended to secure an unbiassed estimate of yield, there can be no justification for leaving the selection of fields to the personal vagaries of the staff. The selection has to be so made as to give every sample plot an equal chance of being sampled in order that the normal yield may be accurately determined,.....without bias."

The only way to find out the extent of bias in the estimated yield is to determine the average yield in the year by conducting crop-cutting experiments based on

*Refer Page 37 of "A Seheme for an Economic Census of India" by Dr. A.L. Bowley and Mr. D.H. Robertson.

†Refer Page 926 of "Commerce Annual Review Number "December 1945 (Column four)

the random sampling method for the selection of plots which should be increased in number as well. Such an experiment was carried on by the Imperial Council of Agricultural Research in 1943-44 under the direction of provincial statistical Advisers. This experiment included the area covered by the wheat belt of India which is found occupying five wheat growing provinces of India viz North-West-Frontier-Province. the Punjab, Sind, the United Provinces and the Central Provinces. The method employed was the stratified plan of random sampling. Tahsils were the strata while village, field and plot of suitable size were different units of sampling. Villages were selected at random from each Tahsil and were distributed in each strata directly in proportion to the area under the crop in that strata. Then the selection of villages fields and plots was made by the help of random numbers. The yields for separate districts, provinces and the whole wheat belt were calculated. It was found that the difference between this estimate and the Official estimate was sometimes more than 100% in the case of districts; but for the U P. the official estimate was higher than the sample estimate by about 15%. This 15% cannot be ignored as sampling error and definitely proves statistically that the official estimates are biassed to a very great extent. Very appropriately the conclusion is given in the following words by Dr. Sukhatme*:—

"The results indicate that, if these experiments are repeated for a number of years, the resulting district normal yields will differ considerably from those now adopted by the Provincial Governments in calculating official estimates of outturn of wheat"

The same results will be found to be true in the case

* Refer Page 927 (Column Second) of "Commerce Annual Review Number', December 1945.

of other agricultural commodities if a parallel method is followed.

Consequently we conclude that unless there is a total overhaul in the method of collection of the above data their value will remain doubtful and they will never be used with confidence by anybody.

CHAPTER III

Wholesale Price Index Numbers

The importance of an accurate and reliable agricultural *price index* can never be overstressed. The urgency of its calculation was always there but recently for various reasons it has become all the more necessary. The agricultural price index is a good reflector of the Indian cultivator's income. Since India consists of an overwhelming majority of agricultural population anything that helps in gauging the condition of such population should not be treated lightly as has been done till now. With the advance and application of democratic principles in the Government of countries the interests of the majority of the population cannot be overlooked. The representatives elected to the assemblies naturally have the good and betterment of the voters in their heart. In the case of India these electors are mainly the agriculturists. In order to improve their economic and general condition there must be gathered concrete information of their condition. Thus it has become of utmost importance to the popular representatives in the assemblies as well as to the well-wishers of the agricultural population of India to get hold of as much data in this direction as possible and to secure all available information as regards their condition—economic or otherwise. The last depres-

sion, the rise of kissan discontent throughout the country, and similar other causes together with the World War II have increased the importance of such measures and today we find a wide interest in all ranks for the Indian Cultivator. They discuss the problems and draw conclusions; but for want of statistical tools of analysis these conclusions are like the big houses built on weak foundations and consequently they collapse. In order to get correct and unbiased information as regards the Cultivator's condition what we require are not empirical conclusions which are the results of such discussions but conclusions based on tested facts. The agricultural index numbers go a long way to remedy these defects.

Such are the reasons why we find in every advanced country index numbers of wholesale prices which are calculated through the efforts of the Government or private individuals or societies.

India also started publishing certain similar index numbers, of which the following were being regularly published till recently in the "Monthly Survey of business conditions in India."

(1) Calcutta Wholesale Price Index Numbers
(2) Bombay " "
(3) Madras " "
(4) Cawnpore " "
(5) Index numbers of weekly wholesale prices of certain articles in India (Economic Adviser's Index).

Out of these five two i. e. the third and the fourth are seldom used and thus are not given much importance by the statisticians. Out of the remaining three I am told by the Assistant Commissioner of Labour, Bombay that the Bombay Wholesale Price Index series has been discontinued with effect from November 1943.

It is evident that the remaining two are insufficient for a big country like India where distances are great and price disparities quite considerable. Further, the above index numbers are constructed on lines parallel to those followed by the English Statisticians ; no attempt has been made towards taking into account the differences in the conditions prevailing in India and other countries. Such were probably the reasons for the vehement criticism of Dr. Bowley regarding these index numbers in the following words:—*

"It is very doubtful whether any good purpose is being served by the construction of local wholesale price index numbers for Calcutta, Bombay etc, and we do not propose to discuss them.

"The existing general index number of wholesale prices in India is undoubtedly unsuitable for its purpose. The figures are expressed as percentages of the year 1873, the list of commodities has not been revised since 1889† (so far as we could ascertain) and includes indigo and other commodities no longer of importance, and it is unweighted. It is similar in its construction to the old British Board of Trade Index number, which was discarded, because of its imperfections, about 1920. We strongly recommend that a new index number should be constructed at once on the model of that of the Board of Trade. The distinction between prices of Imported and Exported goods (which we discuss below) should be dropped and replaced by categories similar to those in great Britain (Food and Not-food with sub-division into cereals etc. in the first and Minerals Textiles etc in the second). We recommend the adoption of the geometric mean as in Great Britain especially because it allows automatic change of the date at which it is equated to 100 which will be necessary for comparison with other index numbers when they

* Refer Page 44 of "A Scheme for an Economic Census of India" by Dr. A. L. Bowley and Mr. D. H. Robertson.

†Except for slight alterations in the choice of quotations. Entries for kerosene oil and coal first appear in 1888 and 1889 respectively.

are constituted".

"It is suggested that in the first instance the year 1926 or 1927 should be chosen for equation to 100. The main fall of prices from the maximum in 1920 was finished by 1923 or 1924, and the year 1924 has been selected in some cases in other countries. But the rupee exchange on London did not settle down till 1926, and this is prima facie a good date to select. English index numbers, however, were disturbed by the effects of the coal dispute in 1926, and this would lead us to recommend 1927. The choice of the exact year in this period should be carefully considered".

Before embarking on a detailed discussion of the defects in these index numbers it is essential to give briefly some details regarding their construction. Hence three of the wholesale Price Index Numbers used in this country are described below.

Calcutta Index Number:—

This index includes 72 items which are divided into the following sixteen groups:—

1	Cereals	which include	8	items
2	Pulses	,,	6	,,
3	Sugar	,,	5	,,
4	Tea	,,	3	,,
5	Other food articles	,,	9	,,
6	Oil seeds	,,	3	,,
7	Mustard oil	,,	2	,,
8	Raw Jute	,,	3	,,
9	Jute manufactures	,,	4	,,
10	Raw Cotton	,,	2	,,
11	Cotton manufactures		7	,,
12	Other textiles (wool and silk)		2	,,
13	Hides and Skins	,,	3	,,
14	Metals	,,	6	,,
15	Other raw and manufactured articles	,,	8	,,
16	Building materials	,,	1	item.

The prices on which this index number is based are the *wholesale prices* prevailing at the end of the month under review as reported in *Calcutta*. A separate index is computed for each group. The index for any group is obtained by taking the average of the price relatives of the articles included in that group. The fixed base period adopted is the single month July of the year 1914.

Indirect weighting is introduced within each group, for example under cereals four varieties of rice are taken while Wheat, Barley, Maize and Oats have one quotation each. To compute the General Index Number, a simple arithmetic average is taken of all the individual price relatives included in the construction. This index is compiled and issued monthly by the Department of Commercial Intelligence and Statistics, Calcutta. It is published in the Indian Trade Journal, the Monthly Survey, The Calcutta Journal and the Capital.

Economic Adviser's Index Number

The Office of the Economic Adviser have been publishing index numbers of wholesale prices for various groups of articles since the outbreak of the War. Among these is included the food group, the index for which is worked out as the *simple* geometric average of the price changes of a few selected articles of food including tobacco. In normal times such an index could be depended upon to reflect the course of food prices faithfully enough but with the large dispersion which had recently set in in the movements of individual food articles a simple average which excluded the millets and pulses, *gur* and salt and included articles like groundnuts, copra and tobacco could not be expected to retain its representative character. In view of the immediate need for a more reliable indicator of food price movements, this Office have now initiated a new

index including all the *important* articles of food that enter into the trade of the country. The base period for the index is the last week of August 1939.

The new index is a weighted geometric mean, the weights being proportional to the value of the marketable surpluses of the various commodities during the year 1938-39. In the case of rice, wheat, sugar and *gur* the estimates of the quantities retained by the producers as worked out by the Agricultural Marketing Department have been utilised in the calculation. In regard to *jowar, bajra* and gram it has been assumed that one half of the production is placed on the market, but in the case of the remaining commodities the whole of the output is assumed to be available for exchange. In working out the values of the various commodities for the purpose of deriving the weights, the average market wholesale prices during the year have been used. The weights for the various items as finally worked out are :—

Rice	„	36	Tea	„	7
Wheat	„	12	Coffee	„	1
Jowar	„	8	Sugar	„	13
Bajra	„	3	*Gur*	„	9
Gram	„	5	Salt	„	3
Dal	„	3			
			Total.		100

Among omissions in the list are condiments and spices, vegetable oils and ghee. The items in the first and second groups are not entitled to any considerable weightage and their omission (which has been necessitated by the lack of data) cannot greatly affect the index. *Ghee* would have a greater significance but in this case quotations are available only for the Calcutta centre and from the All-India point of view, such quotations cannot claim any degree of representativeness. Under

present conditions their inclusion in the index is bound to be greatly misleading and in the circumstances it was thought advisable to exclude this item also from the list.

The price relatives for the individual varieties of each commodity are first averaged geometrically into a single price relative for that commodity. The geometric average of the eleven price relatives thus obtained, the proper weight being assigned to each one of these as specified in paragraph 2, is the final food index for the week.

Dr. Gupta's Index Number of Wholesale Agricultural Prices:—One series of index number of wholesale agricultural prices available for the United Provinces has been prepared for the period 1900—1932 by Dr. Raj Bahadur Gupta, Statistician, Bureau of Statistics and Economic Research U.P. and has been published as Bulletin no. 1 of the same Bureau. Since 1933 these index numbers are published regularly in the different issues of the Provincial Gazette.

(1) Wholesale Prices:—These have been compiled for rice (common), wheat, barley, gram, maize, Arhar Dal, linseed, til, sugar (raw), and tobacco, these being, in the opinion of Dr. Gupta, the important agricultural products of the provinces. The prices given are the simple arithmetic averages of wholesale prices during the 24 fortnights of each year in four districts (mandis) in the province which have been regularly reporting such prices. The wholesale prices are these prevailing at the head quarters of the districts and are reported by honorary bazar chowdhries to the District officers concerned. The district officers forward the figures to the office of the Director of Land Records where they are compiled and sent to the Government Central Press for publication in the United Provinces Gazette.

Statistics of wholesale prices are those at which wholesale transactions are affected on the last day of each fortnight or the nearest market day. If no actual transaction of at least 10 mds. in the case of food grains and oilseeds and of at least 1 md. in the case of cotton, tobacco etc., takes place in a fortnight in the market, no price is quoted for that fortnight. The prices are generally quoted for those markets where the articles in question are staples of local trade.

(2) Basic Period:—A single year 1913 has been chosen as the base for the series because in the view of Dr. Gupta, the year 1913 was completely free from all extraordinary circumstances and for the purpose of maintaining uniformity with price indices published by the Board of Trade, London, and other important countries of the world.

(3) Weights:—The index numbers have been weighted according to the comparative values of the commodities, based on the relative area which they occupy and the average yield of each per acre in the base period. The actual procedure adopted is as follows:—The area, the yield and the price of each commodity are multiplied together and the sums thus obtained for each individual commodity are added together. The percentage of each sum to this total is the weight for a particular commodity The weights thus obtained for each crop are thus in proportion to their relative economic value.

(4) Averaging :—It appears that the average followed in preparing the General Index number is the weighted arithmetic average, though it has not been mentioned clearly there.

All these Indian index numbers have got similar weaknesses and so it will be sufficient to take

any one of these as an example and point out its shortcomings. Since we are interested in the index numbers for the United Provinces to the greatest extent we will select for our purpose of analysis the Cawnpore Wholesale Price Index Numbers, which have been prepared for the period 1900—32 by Dr. Raj Bahadur Gupta, Statistician, Bureau of Statistics and Economic Research U. P. The method of construction has been given above briefly. However, these index numbers are inadequate and mathematically unsound for the following reasons :—

(1) The base period adopted in the calculation of these index numbers is a single year (1913). The conditions may be taken to be normal during that year, as the writer says, but sticking to the same base period even in the changed and modern conditions seems to be far from satisfactory. In my opinion this year has been adopted more in order to bring these index numbers on a comparable basis with the index numbers published by the Board of Trade, London, than for its normality as far as India is concerned ; at any rate nowhere does Dr. Gupta claim to have proved such normality based on statistical study. Further a single year is not the base period as suggested by considered opinion of statisticians and accepted by Dr. Gupta himself to be such when he says on page (3) of the above named bulletin

"After examining the views of various authorities on the subject we have come to the conclusion that a basic period of 5 or 10 years is preferable to a single year"

Thus the base period should have been obtained by taking the average of the figures during the years forming a complete cycle.

[In the case of Economic Advisers index recently they have started taking the last week of August 1939 as the base period. This particular week cannot be taken to be normal unless a full discussion to establish that fact is given. Even if it can be shown to be normal, the single year or week is not preferable as base according to the opinion of statisticians].

(2) The weights chosen by Dr. Gupta are themselves far from being mathematically correct. The weights given to Rice and Linseed are zero each.[1] Clearly zero weight to a commodity is a misfit. What should have been done is either not to consider these commodities at all or to devise a method for calculating weights in which these commodities should get their due share however small. The latter can be easily done by taking the weights not as the percentages of the total as has been done by Dr. Gupta but by taking the proportional numbers indicating the values of the commodities as given by the product of the normal yield, total area under cultivation and the price of each commodity.

(3) The index numbers are obsolete and out of date due to the changed conditions in agricultural sphere. The areas under cultivation and the yield per acre have changed in many cases. This point was proved statistically in my paper[2] "Index numbers of wholesale agricultural prices in Agra." The weights were calculated by me by considering the normal yield, area and prices during the period 1927—29. The weights which were calculated by me in that paper are given in the following table side by side with Dr. Gupta's weights as taken from the bulletin (name given before) to show the difference.

(1) Refer Statement VIII (A) on page 54—56 of "Agricultural Prices in the United Provinces" by Dr. R.B. Gupta

(2) Prepared in 1940 and submitted to Agra University.

Weights for the City of Agra

Number.	Name of Commodity	Dr. Gupta's weights based on 1913 figures	Weights calculated by me based on 1927—29 figures
1	Wheat	30	89
2	Barley	20	52
3	Maize	3	2
4	Gram	20	156
5	Arhar Dal	12	13
6	Til	1	2
7	Cotton	10	111
8	Sugar raw	1	90
9	Tobacco	3	5

Dr. Guptas' weights are expressed as percentages of the total while the weights calculated by me were obtained by the method of approximation (by discarding the last 5 digits of the total values in rupees obtained by multiplying the area, average yield and the average price of different commodities during the period 1927—29]. A comparison shows a considerable difference in the relative importance of the various commodities. We see that Dr. Gupta's weights give the greatest importance to wheat followed by barley and gram respectively while those calculated by me give nearly double weight to Gram as compared with wheat. Barley goes considerably below gram and wheat in importance; cotton and sugar (raw) occupy the second and third places respectively after gram, while in Dr. Gupta's weights they occupied the fifth and the last places respectively.

What has been found true in the case of Agra will also be found true in the case of other cities for which Dr. Gupta has given the index numbers. However

now we are in a position to conclude that for the present changed conditions the weights chosen by Dr. R. B. Gupta are inadequate and hence those more in keeping with the facts of the times should be adopted.

(4) It has been established by various authorities on Index Number construction that the same base period cannot be used for a very long time. The year 1913 has outlived its usefulness and hence must be replaced by some more recent period.

(5) Only the index numbers for different cities, Agra Cawnpore, Lucknow and Benares, have been calculated ; no general index for the whole of U. P. has been constructed while we know that this last index is definitely more important than that for the different districts or cities.

Thus we conclude that in India index numbers of wholesale agricultural prices are inadequate and incorrect. Consequently new index numbers based on accurate and scientific methods must be constructed not only for India but also for the different provinces. The broad outlines on which these index numbers are to be calculated have been to some extent indicated by Dr. Bowley in the quotation given before and these should henceforward be followed after some necessary modifications for the construction of Indian Index Numbers.

In India the index number construction is considered to be a practical problem ; most of the computers have calculated index numbers by methods similar to those followed by the western computers and hence they have only conducted laborious mathematical calculations with or without the help of calculating machines in order to obtain the indices. The theoretical side has been more or less neglected by most of them. They have never tried to find a better method of construction of these index numbers. Their methods did not evolve after any careful and exhaustive study with a view to get a

reply to the question 'can there be a better method of construction of these index numbers ?' During the initial stage when statistics was not very popular in the country there was no harm in doing so and this might have been considered as sufficient. However, the recent tendency of advanced countries is to find out the best possible method for the construction of any series of index numbers before actual construction. This can only be done by giving an exhaustive, careful and scientific theoretical discussion before the actual construction of these indices. It is high time for the statisticians of this country to realize the importance of theoretical discussions.

A series of Index numbers of wholesale Agricultural prices for the period 1934—45 was constructed by the author in the year 1946. This series was constructed after giving a detailed, exhaustive and scientific discussion of the various problems with a view to evolve the best possible method for its construction. Geometric mean, and not the arithmetic mean, was adopted in the construction and new weights were obtained for the different commodities. An entirely new base period, the average of the years 1926—29, was taken to be the base year for calculations of the price relatives.

CHAPTER IV

Index Number of Industrial Raw Materials.

A new series of index numbers of industrial raw material prices has been issued by the Economic Adviser to the Government of India. The base period is the year ended August 1939 It is weighted and consists of 19 items under the groups Textile Fibres, Oilseeds, Minerals and Other Materials.

Industrial raw materials constitute an extensive field; but the selection of the items from this field for inclusion for a wholesale price index must at present be restricted due to the fact that in some cases the statistical data of the prices is not available. This is particularly true in the case of mineral products. However an attempt has been made to include all the important items and to omit, due to the above reason, items whose relative value of output is very small.

The number of commodities included in the compilation of the index is 19. Under the group of Textile Fibres, raw cotton, raw Jute, raw silk and raw wool have been included. Ground nuts, linseed, Castor, rapeseed, Gingelly, cottonseed and copra have been included in the group "oilseeds". Under the group "Minerals" coal, manganese ore, mica and iron ore form the different items. Other Materials consist of

raw hides, raw skins, lac and rubber. For the purposes of calculation, important and representative varieties of these commodities and their wholesale prices in their main markets have been taken into account.

Owing to probably the lack of quotations for some item for the last week of August 1939, the usual base period adopted by the Economic Adviser, for the calculation of his other index numbers, this week was not adopted as the base period and the year ended August 1939 has been accepted as the next best choice by him.

The weights assigned to the various items in the index are proportional to the values of the commodities as determined from the estimated quantities marketed and the prices prevailing during the year 1938—39. Thus in the case of coal the quantity consumed by the miners has not been taken into account. In the case of cotton and jute, as well as oilseeds and hides and skins, a rough allowance has been made for the amount retained by the producers. The estimates of the proportion of the output retained by producers as arrived at in the marketing reports and in the Handbook of Commercial Information and similar sources have been utilised in this connection. In the absence of information to the contrary it has been assumed that the whole output has been put in the market. In the case of commodities like raw cotton silk, wool and copra, the value of retained imports has also been taken into consideration before distributing the weights. The weights assigned to the different items are as follows —

1.	Raw Cotton	28
2.	Raw Jute	22
3.	Raw silk	1
4.	Raw wool	2
5.	Groundnut	12
6.	Linseed	3
7.	Castor	1

8.	Gingelly	3
9.	Rapeseed	5
10.	Cottonseed	4
11.	Copra	2
12.	Coal	6
13.	Manganese ore	2
14.	Mica	1
15.	Iron ore	1
16.	Raw hides	3
17.	Raw skins	2
18.	Lac	1
19.	Rubber	1

The price relatives for the individual varieties of each commodity are averaged geometrically into a single price relative for that commodity. The geometric average of the nineteen price relatives with their respective weights give the final index for each week. A separate index is also calculated for each of the four sub-groups.

The index is based on sound mathematical principles of a good index and it is creditable for the Economic Adviser to have initiated such an index. However the number of items which is included in the index is inadequate and must be increased. For this it is necessary that the price quotations of some more commodities should be obtained by the government. Besides this improvement, the method of assigning weights on percentage basis should be discontinued as it is mathematically unsound. This is obvious by considering that while approximating to calculate these weights 1.4 is taken as 1 and 1.5 as 2 hence the weights come out to be in the ratio 1:2 while actually their ratio is 14:15. The error thus committed can be minimised by taking comparatively larger weights. In any case no weight should have less than two significant digits.

Cost of Living Index Numbers

A number of cost of Living Index numbers for the working class for a number of cities of India are being published regularly in the "Monthly Survey of Business in India" and provincial gazettes or bulletins. The method of construction is more or less similar and will be clear by that given below for one of these index numbers.

Bombay Working Class Cost of Living Index

Between May 19.1 and April 1922 the first enquiry was conducted by the Bombay Labour office for getting the family budgets of the working class of the city of Bombay. A similar enquiry was conducted again between May 1932 and June 1933. This second enquiry enabled the determination of the weights which were calculated by estimating the expenditure on the different items consumed by an average Bombay worker's family. An index was prepared on the basis of the first enquiry, however it was revised as a result of the second enquiry.

The items included in the revised index have been divided into five main groups. These are:—

(1) Food
(2) Fuel and Lighting
(3) Clothing
(4) Rent
(5) Miscellaneous.

The 28 articles included in the food group are: rice, *Pàtni*, wheat, *Bajri*, *Turdal*, *Jowari*, gram, raw sugar, refined sugar, tea, four varieties of fish, mutton, milk, ghee, salt, dry chillies, tamarind, turmeric, potatoes onions, brinjals, pumpkins, cocoanut oil, sweet oil and ready made tea. The expenditure on any other items which can be included under food group has been added to an item which can easily absorb it for ex-

ample the expenditure on sweetmeats has been included in the items sugar and milk. Fuel and Lighting group consists of charcoal, firewood, kerosene oil and matches. Clothing group includes *Dhotis*, coating, shirting, cloth for trousers, *Sarees* and *Khans*. The figure for house rent is obtained by calculating the average rent per tenement as a result of the second family budget. Miscellaneous group includes barber, washing soap, medicine, *Supari*, *Bidi*, travelling to and from native place and newspapers. Thus the total number of articles included in the calculation of this index number is 46. The prices of these articles are collected from the shops in the industrial areas, different cotton mills having retail shops in the city and municipal records of prices of fish, brinjals and pumpkins.

The index numbers are calculated for each group separately. For this, first price relatives are obtained for each item by dividing the price of the particular year by the price in the base year. The expenditure on each item represents the weight which is expressed as the percentage of the total expenditure on the group. The weighted arithmetic average gives the index for the group. These index numbers are combined to give the cost of living index by finding the weighted arithmetic average of the group index number taking proper weights which are obtained by expressing the total expenditure of the average working class family on a group as the percentage of the total expenditure on all groups. The weights of the different groups are given below:—

Food	47
Fuel and Lighting	7
Clothing	8
House rent	13
Miscellaneous	14

This gives a total 89. The remaining 11 percent of the total expenditure of the average working class family is not accounted for because of the reason that all the items on which money is spent are not included in the 46 articles included in this index.

Having described one of the various Cost of Living Index Numbers calculated in India, let us discuss, in general terms, some of the points regarding them. First of all there is difference in the number and nature of commodities included in the index numbers for different cities. As far as the Food Group is concerned they are all fairly exhaustive and hence do not differ very much in this respect but a clear difference is found in the case of other groups. For example C. P., Bihar and Orissa indices do not include house rent and also in the last two provinces the miscellaneous group is ignored. Regarding the Clothing Group probably all the indices are unsatisfactory, because sometimes an insufficient number of items of clothing is included and also because the obtaining of comparable price quotations is difficult.

In order to obtain weights for different items family budget enquiries have been made from time to time in each province. However it is only in the case of a few places like Bombay, Nagpur, Madras etc that a detailed and comprehensive enquiry has been carried on. In other places the weights have been calculated by studying an insufficient number of family budget returns. As an example the Cawnpore index is based on 300 family budgets rather than the 1500 family budgets of the mill workers which were collected in 1938-39 by the Labour Office of U. P.

Thus we see that there is a clear diversity in the construction of the Cost of Living Index Numbers of different cities. Consequently these index numbers

cannot form the basis of comparing the conditions of the working class in the different cities.

For the purpose of comparison a fresh index must be constructed in every industrial city on an all-India basis. The details must be worked out by the Central Government Statisticians after due consultations with the statisticians of all the different provinces. The index numbers so constructed must be homogeneous and similar as regards the number and nature of articles included, the method of the calculation of weights, the selection of the proper average for getting the final index and so on.

CHAPTER V

The Measurement of the National Income.

The national income is the money measure of the aggregate of goods and services accruing to the inhabitants of a country during a year, including net decrements from their individual or collective wealth. It is probably best to ignore catastrophic decrements of wealth such as might be caused by an earthquake or a severe epidemic of cattle plague and similar other causes.

The question of the calculation of the national income of a country is very important and it has attracted the attention of various statisticians of different countries. As a result we find a number of very good estimates of the national income of a number of advanced countries. The idea behind the calculation of the national income of a country is more or less similar to that which is behind the attempts to calculate the income of an individual. An individual's income is useful for the following purposes:-

(a) Taken over a number of years it can be used as an index of the progress of the individual in economic status.

(b) It gives a basis for comparing his position with the positions of other individuals in society

(c) It gives a measure of his standard of living and the amount which he can spend over conveniences and luxuries.

(d) It determines the incidence in matters of taxation or other compulsory burdens.

In a similar way national income of a country is useful in the following directions:-

(a) Taken over a number of years it indicates the progress, in magnitude and direction in the economic sphere.

(b) It is used for comparing the economic positions of different countries.

(c) It indicates the standard of life which the country is capable of giving to its people.

(d) It is extremely important for purposes of public finance in determining the taxable capacity of the people or country.

We will see a little later how it can be calculated but before we do so we must point out a few things. In India materials regarding the national income are either absent or faulty and troublesome. Consequently the calculation of national income which has been based on such data cannot be taken as accurate and hence does not serve our purpose very well. Inspite of all this it is desirable to consider how we should measure the national income of India and from what sources we can get the material for doing so In this connection we give below the suggestions of Bowlev Robertson Committee because on theoretical and historical considerations they must be given credit for putting forward a fairly suitable scheme for the calculation of national income of India.

Methods of calculating national income

There are two methods of calculating national income, viz:—

(1) Evaluation of the goods and services accruing to an individual; and

(2) a summation of individual incomes.

In India none of the two above methods can be applied separately. Thus it would be necessary to combine the results of the two methods carefully. The first or Census of Product Method involves the following procedure:—

(1) Evaluating the net output of the various branches of productive enterprises at source, avoiding double countings.

(2) Adding this value, to home-produced goods and to imports by transporting and merchanting agencies in the country.

(3) Adding excises on home-produced goods.

(4) Deducting the value of exports (f. o. b.), including gold and silver;

(5) Adding the value of imports (c.i.f.) including gold and silver;

(6) Adding custom duties of imports;

(7) Deducting the value of goods, whether home-produced or imported, which are used for maintaining fixed capital, or stocks of raw and finished goods;

(8) Adding the value of personal services of all kinds;

(9) Adding the rental value of houses, whether occupied by owners or hirers.

(10) Adding the increments in the holdings of balances and securities abroad, at the same time deducting the decrement therefrom; or deducting the

increment in holdings of foreign residents, or adding the decrements of such holdings.

As regards the first, that part of the agricultural produce which is consumed by the producers or bartered locally for services should be valued at its prices at the point of production and not at retail prices in various markets.

As regards items (3) and (6) this is necessary because the total we are in search of is the aggregate of exchange values to the consumer.

As regards items (4), (5) and (10), the loans of British investors are their income and are to be deducted. Similarly, the value of imports should be added and that of exports deducted to get the total net income.

The same is true of bank balances and precious metals.

As regards (8), those services should be included which confer direct utility—protection, amenity of life etc. and not those undergone in the production which are included in item (1). These services include the value of pension rights too.

As regards character gifts, they may be included in national incomes on some arbitrary principles.

This method is the more fundamental of the two. However, in order that the results of the second or Census of Incomes methods may fall with it, certain precautions in following this second method must be observed.

These precautions are:—

(1) All self-consumed produce and annual value of houses should be included in the individual's income valued at their selling value at the point of production or contract.

(2) All interest charges are to be deducted.

(3) All income from interest on securities, pensions

of ex-Government servants and other individual incomes should be entered without deducting income tax thereon. Other individual incomes include pension rights, undistributed profits of companies and the net profits of Government enterprises. From the total of these should be deducted interest on Government loans other than for productive enterprises, and the pensions of ex-Government servants, whether due at home or abroad.

(4) To the above total add receipts from customs and excise, stamp duties and local rates, i.e. all taxes which are of the nature of business costs.

Suggestions as regards the estimate of the broader section of the national income:—

National wealth as a whole can be measured by:--

(a) Capitalising the yield of all income bearing property including goodwill, assigning appropriate numbers of years' purchase to the rent of land and houses, dividends, interest etc. and sometimes to add estimates of property publicly owned such as docks, railways, government buildings etc.

(6) Using the statistics of property passing at death.

Neither of the two methods can be applied to India because of inadequacy of information, and absence of inheritance tax respectively.

It is however, possible to give indications as to the change in the total wealth, by series relating to public expenditure on permanent works, to investment of new capital and to other expenditure of the nature of capital outlay. This may to some extent help in arriving at net income after it has been deducted from total outlay.

The investigation, proposed by them, for estimating the national income is primarily on the basis of pro-

duction, but a minor part depends on individual incomes. Partly owing to difference in nature of the products and partly because different methods of investigation are necessary, rural income is distinguished from urban income.

For rural income they recommend an estimate of:—

(1) The quantity and value of all goods, and

(2) value of all services,

Both of which may be arising from land or rendered in the village. In this case, they say, the method of intensive surveys in selected villages will be suitable.

For urban income they suggest, in the first instance, surveys at the larger towns based on a sample enquiry of the personnel and occupations of families and an estimate of their incomes by.

(1) Personal Statements,
(2) Investigation of wages and salaries.
(3) Investigation of income-tax statistics.

Besides the estimation of rural and urban incomes they recommend an intermediate urban Population Census. These three inquiries are to be supplemented by a census of Production applied to factories using power, mines and some other industries. This undoubtedly will give some information which has already been obtained under rural and urban surveys but it is expected this duplication of income will be avoided easily.

Rural Survey

They have suggested the random sampling method for an intensive survey of the villages. A list of villages should be prepared, with regard to provinces. These should be arranged in a geographical order of districts, then we should decide the number of villages to be investigated. Later on we should start from some random number and mark out the required number of villages, all nearly

equally spaced. It is good to begin with some random number instead of beginning with the first village. They have given the number of villages in different provinces and the number to be investigated out of them.

The investigator should be trained and should live in each village for 12 months. In many cases the villages could be grouped in threes or fours, say 30 miles of each other. To each of such groups a superior investigator would be attached, who would live in the largest village and do supervision work. Each province should be under the charge of a qualified statistician and the entire survey should be controlled by the Director of statistics. The necessary forms should be prepared by the director in consultation with Provincial Statisticians. They should be adapted to local conditions, and local terms of weights, measures, etc. Besides the main enquiry which is directed to income, production, consumption and allied topics, the investigators should have ample time to report on subjects like health, cooperation, debt, etc.

The questionnaires for this purpose should be based on sound principles.

Urban Surveys.

For towns random sample method does not suit. The problem is to be tackled step by step, first by a survey of those cities in which universities can organise satisfactory investigation, secondly, by making similar, though not so intensive, surveys of other towns. After the rural surveys and the University City surveys are completed, efficient investigators should be engaged to survey selected towns.

University City Surveys.

In the organisation of these surveys central control should be combined with local autonomy. A central committee should be set up to draw an outline schedule

of enquiry, to advise on any points referred to it and to present a report on the whole subject in the end.

If the surveys fall to Goverment Colleges, cooperation of Director of Public Instruction and the Educational Department would be necessary. If they fall to self governing universities, arrangements would be made with the Economics Departments of the Universities concerned. City surveys should be directly carried on by a member of the Economics staff. The detailed investigations should be carried out by graduates or post-graduates reading Economics.

The subject of statistics should be so introduced in the Universities that the students automatically get some interest in such practical works. There should also be an examination of their studies of this kind. This would facilitate the work to a further extent.

Finally the universities should be prepared to undertake any statistical economic work for a provincial Government, and act in cooperation with an Economic Advisory Council, where one exists.

There are two methods for a detailed survey as mentioned by them. These are:—

(1) Occupational Method and

(2) Families Method.

(1) Occupational Method:—In each industry and occupation in the town, enquiries should be made regarding current rates of earnings and wages, estimated over the year and allowing for seasonal variations. There should be those employed in constructive industries as well as clerks, municipal and railway employees, tonga-drivers and all others working for salaries or wages or making small profits. There should also be a record of the method of payment (piece or time), the organisation of employment (direct, working on own account etc). Marketing of the products should also be noted down.

(2) As regards survey by families method, an accurate list of houses is necessary. Big towns, say of more than 150,000 persons, may better be divided into wards or groups of wards, so that a unit may consist of 30,000 houses. About 1,000 houses may be selected in each unit on random basis, and visited by the investigator. House once selected should not be substituted by another.

The visitor should establish friendly relations with the residents. In this way reliable information about number, sex, age and occupation of the family group would be easily obtained. The investigator should visit the houses repeatedly. He should fill the schedule immediately after the visit. The totals should in case of doubt be given as within a certain range. A thorough study of all existing data relating to the subject of survey emanating from central and local authorities, trade organisations etc, should be made. Cooperation of these official and non-official organisations should be sought.

Census of production

The central legislature should impose this kind of census by special Act making thereby the communication of the facts demanded compulsory. The Director of Statistics would conduct it better. Industries employing twenty or more persons and using mechanical power, some small workshops, certain industries where mechanical power is not used such as brick-making and carpet manufacture, railway and all establishments under the Mines Act would be covered.

Factory industry is, however, progressing at the expense of cottage industry, therefore, it would be better if the two are brought closer to each other. On the basis of their yearly data, an idea of their relative increase or decrease would be available. The aggregate value of the sales and the aggregate cost of materials for each industry, or some of the necessary facts are to be collected.

The difference of the above two shows approximately the national income accruing to the factory. When all factories are considered, the above kind of aggregate difference minus depreciation of plant and change in the value of materials and finished goods would be a measure of the contribution to the national income of the industry.

The products should be classified in the same way as exports and imports. The classification of employees should be among salaried persons and wage-earners, young and adult with a statement of the age division between the two sexes. Besides, details can be obtained of the amount and values of different commodities produced, and of materials bought, and of power used.

There would be much opposition, objection and difficulty in the beginning, but this will be disappearing in course of time.

The above discussion gives the method as to how the national income of India should be calculated. However, in actual practice this elaborate method cannot be used due to the fact that all the data required for following the method suggested by Bowley-Robertson Report is not available in India. Inspite of this there have been various attempts during the last few years to calculate the national income of India. The last and in my opinion the best estimate is by Dr. V. K. R. V. Rao. He has estimated the national income of British India for the year 1931—32. He has left out Indian States for the simple reason that the statistical data required for the purpose is scarcely available in the Indian states. His estimate has greater value than others because besides the improvement in method of computation he has been wise enough to select a census year for his study and because his work is the most recent. His calculation has been guided by the following practical and simple definition of National Income.

"The National Income of a country is the money value of the flow of commodities and services, excluding imports, becoming available for sale (or capable of being sold) within the period, the value being reckoned at current prices, minus the sum of the following items:--

(a) The money value of any diminution in stocks that may have taken place during the period.

(b) The money value of the flow of goods and services used up in the course of production

(c) The money value of the flow of goods and services used to maintain intact existing capital investment.

(Value being recorded at current prices in all these cases).

(d) Receipts of the State from indirect taxation.

(e) Favourable balance of trade including transactions in treasure

(f) Net increase in the country's foreign indebtedness or the net decrease in the holdings of balances and securities abroad, whether by individuals or the Government of the country."

Dr. Rao has proceeded from this practical definition and has given an exhaustive discussion of the statistics available for different items which he includes in the calculation of the National Income of the country. A book has been written by him giving the discussion containing more than 200 pages in which he has calculated the following:—

(1) Estimates of income in the country based on the occupational statistics contained in the census of 1931.

(2) The quantity and the value of agricultural output.

(3) The quantity and value of livestock products such as milk, meat, wool etc.

(4) The quantity and value of fish, forest produce and minerals.

(5) The income of that section of non-agricultural earners who pay income tax.

(6) The income of the industrial workers.

(7) The salaries and wages of workers employed in the service of the State and in the working of railways, posts and telegraphs.

(8) The income of persons engaged in trade and in forms of transport other than those dealt with previously.

(9) The income of earners engaged in professions and liberal arts.

(10) The income of domestic servants.

(11) The income from other miscellaneous items like house property etc.

Some of the data regarding these he has taken from the report of the census of 1931. In some cases he sent forms and questionnaires to different persons and agencies and obtained the data himself; the method so adopted for getting the data did not always prove successful as is clear by his acknowledging that on issuing a circular letter to 785 Indian municipalities for getting information regarding the statistics of the slaughter of cattle and goats in their licensed slaughter houses, he could get only 116 replies. Surmounting these difficulties Dr Rao proceeded with his work and ultimately got the National Income of India with a fair degree of reliability. His calculations give us the income of British India for 1931—32 as Rs. 16891 millions with a margin of error ±6 per cent. This gives the per capita income as Rs.62 with a margin of error of ±6 per cent.

CHAPTER VI

Crop-cutting Experiments

The yield of a crop in any given year is calculated by multiplying the three factors, viz., the area under the crop, the normal yield per acre and the seasonal factor. This last is the condition figure which expresses the relation in the form of a percentage of the actual crop to the normal crop usually in terms of annas to a rupee. The normal yield is defined to be an average yield on an average soil in a year of average character. The normal yield per acre is found as a result of crop-cutting experiments conducted for each crop on plots of average quality.

Method

The details of the method of crop-cutting experiment have been given here according to an experiment some part of which I witnessed in the village of Masera Kurd (Tehsil Lalitpur District Jhansi) during the year 1945 for the crop kodon conducted under the supervision of government officials.

The Standard Plot

A typical field, representative of a fair crop under certain soil and water conditions, was found out. Of this field a portion 1/20th of an acre exactly is marked off and is called the standard plot.

The Kanungo selected by a general survey and his experience ten or twelve fields as being fairly typical. The Deputy Collector or the officer in charge then put the numbers corresponding to these fields into a receptacle and drew out one at random. The number so drawn indicated the standard plot. From this field a plot 66 feet by 33 feet was marked at approximately the centre of the field, the distances 66 feet and 33 feet being measured by a chain.

Subsidiary plots

Twenty other plots $\frac{1}{20}$ th of an acre in area were next selected round about the standard plot within a radius of 2 or 3 miles approximately. The patwari reported a number of fields where the same crop as in standard plot was grown. These fields should approximately have the same conditions regarding soil, water etc around the standard plot within a radius of 2 or 3 miles. The numbers of these fields were placed in a receptacle and were selected by lottery drawing method. From each of these fields a plot of 66 feet by 33 feet was marked off as in the case of standard plot. However, in the case of these subsidiary plots the area was marked roughly or approximately.

When yields from a definite number of small areas scattered haphazardly in a plot are collected the total harvest is called a "Sheaf." The sheaf taken from the standard plot is known as standard sheaf and the sheaves taken from the subsidiary plots are to be called subsidiary or sample sheaves.

The sheaves are obtained by the following two methods:—

(A) The "hoop" method.—

The hoop is circular in shape and is made of iron—the internal diamater is $3'6\frac{3}{4}''$ so that the area covered by the hoop is 10 sq. ft. approximately. The hoop

is placed in a plot at 22 places at random and the crop lying within the hoop is cut every time. As each hoop content is cut it is added to the outturn of the others. The total sheaf is threshed out.

(B) The "rod" method:—

The rod consists of a lath of a fixed length (6·6 feet approximately) with an off-set at one end ($1\frac{1}{2}$ inches app.) The off-set is screwed to the main-plank supported by a metal strip. The method is applied when the crop in the plot is sown in definite fairly evenly spaced rows or straight drills From each row one length of crop is cut. To remove the bias the rod is placed at one end in the first row at a distance 6·6 feet in the second row, at a distance 13·2 feet in the third row and so on. Then again in the 11th row it is placed at the beginning of the row. The cuts from all the lines are combined to form a sheaf. The method is applied to the standard plot as well as to the twenty subsidiary plots.

Residue:-

After the 22 randomised cuts from the standard plot composing the standard sheaf have been cut, what is left is called the Residue of the standard. This residue is next harvested. This is added to the outturn obtained by threshing the standard sheaf, to give the outturn of the standard plot.

Random Selection of Fields

This part of the experiment is the most vital one. For on the correctness of the technique of random selection depends the correctness of calculated estimation of yield of a particular crop. Different techniques have been evolved by different statisticians and are being used according to the problems involved.

Two methods find favour at present. (1) Lottery

drawing as followed in the above method. In this method the numbers corresponding to the fields are written on chits of papers and are placed in a receptacle. One of the chits is drawn at random at a time and the field corresponding to the number on the chit drawn is selected.

This method has a number of defects which are quite obvious. Firstly all the chits when placed in the receptacle do not stand the same chances of selection, for those chits lying on the top find greater favour of selection than those lying below. Besides all other defects the most serious one is that the chance of drawing a chit is different every time we draw it. For example let there be 100 chits. The chance for drawing the first chit is 1/100. After the first is drawn there remain only 99 chits and so the chance for drawing the second one is 1/99, and so on. If we replace the chit after drawing for the first ime then again we will increase the chance of drawing the first chit. So the lottery drawing technique fails to give us a truly random selection of fields.

(2) The other method which these days is widely used by statisticians for obtaining a random sample is by the use of Tippett's "Random Sampling numbers".In this case use is made of printed tables of random sampling numbers, in which all numbers of four figures are arranged in random order. Starting at any point in such a table and proceeding in any direction, say up or down the column or along the rows, we may take each pair of digits to represent the number of a chit in the above experiment, disregarding any which may be superfluous for the purpose. Next we conduct the selection by putting a finger at random on the table with the eyes open or closed and note the number which corresponds to a field. This process is continued till we get the required strength of the sample.

R. A. Fisher has described this process of randomi-

sation as extremely rapid and one which saves labour and is being followed for conducting sampling experiments in various departments inspite of the discrepancies inherent in it which will be elucidated here and which have been found by experiment to give improbable results.

P. C. Mahalanobis had also noted that certain improbable results were obtained in using Tippett's numbers for verifying sampling moments of D^2-Statistics. He had suggested however that such discrepancies were probably due to using the same random deviates in different combinations and not to a lack of randomness on the part of Tippett's numbers.

In the experiments which were conducted with these numbers, a table of the first forty of the Tippett's sampling numbers was formed. Then hundred observations with each operator were observed. The experiment was performed on hundred operators and the frequency of number was noted in every case.

The general defect which this process of randomisation has been found to exhibit is that it fails to yield a truly random sample. For the experiments, conducted as above, have shown that those squares which lie in the centre of the table were found to be selected more often than those existing on the outskirts of the table. In large number of cases most of the boundary numbers were never selected. This shows that the numbers lying in the centre of the table stand greater chances of selection than the others. Hence the selection is not a truly random one. Besides this another source of error which was noted in the course of these experiments is more or less a psychological one. That is, if we try the same operator to record a large number of observations with his eyes open then after a certain number of trials the operator begins to think lest he may put his finger on the same square a number of times and he tries to search for

those squares which were not selected before. This fear of repetition creeps in the mind of the operator which is a serious source of bias in the selection. For if an idea of particularity comes in the mind of the operator, randomness is influenced and the selection fails to be a truely random one.

Thus we see that it is very difficult rather impossible to select a number of plots at random by any of the known methods of randomisation. Hence unless we find out a proper method for obtaining such a random sample of plots there is no use in carrying on these crop-cutting experiments. I believe because of the want of a proper method of randomisation there had been so much controversy regarding the difference between the crop forecasts and the actual yields obtained. The question being of utmost importance I proceed to give a method of random selection which in my opinion is better, simpler and more reliable than those above described.

Let us suppose that we have to select approximately x plots. Then we take 2x plots which are selected as usual considering the conditions regarding water, soil, manure etc. Next we shall throw a coin which will show either head or tail. The chance for either head or tail is $\frac{1}{2}$. And every time we throw the coin the chance of of a head or a tail remains the same. We may take or reject a particular plot according as it is a head or a tail. In this way we dispose of every plot out of 2x plots and select at random a sample which will contain approximately x plots.

Any objection which can be raised in using this method of selection by throwing a coin is that we can only select approximately half the number of plots. If x is large then the process becomes rather laborious. However, if the method gives us a comparatively accurate estimate then our labour is well paid. Another objection is that suppose that we do not require x plots

but instead a smaller number of plots.

In such cases an alternative method can be followed. This method consists in the throwing of a 'Pasa' which has four numbered faces. We take any four plots and correspond each of them to a number on the face of the 'Pasa'. On throwing the 'Pasa' we get a number on the uppermost face. The plot corresponding to this number will be selected. Next we take 4 more plots and throw the 'Pasa' again. In this way we dispose of all the 2x plots. As is obvious the chance for each plot being included is $\frac{1}{4}$ and there is no bias for any particular plot.

Further if we have to select still smaller number of plots then we shall throw a 'die' which has six faces numbered from 1 to 6. We take any 6 plots and correspond each of them to a number on the face of the 'die'. On throwing the 'die' we will get a number on the uppermost face. The plot corresponding to this number will be taken. Next we shall take 6 more plots and repeat the experiment. In this case the chance for each plot to be selected is 1/6 and the selection is not biased in any way. This throw of the 'die' will give us approximately x/3 plots out of 2x plots.

Thus we see that the sampling techniques which are being employed by the Governments and other departments in conducting such experiments are found to be faulty and as a result we often get wrong conclusions. The alternative method which is given by me, I believe, would prove to be very interesting, simple and better and will yield comparatively accurate estimation of crops.

CHAPTER VII

Role of Statistics in Post War Reconstruction of India.

'Now that the war is over, the immediate problem that confronts the country is that of the transition. From war economy with its controls, its emphasis on the production of military goods, its diversion of resources from civilian to defence purposes, its mobilisation of the man power of the country for the war purposes, and the manifold reactions that such measures produce in the nation's economic life to a peace economy cannot obviously be brought about by one sudden single stroke; the problem becomes even more difficult when one's objective is, as in the case of India. not a mere return to the pre-war peace economy, but the attainment of a new peace economy, which would also be a planned economy intended to bring about a substantial rise in the pre-war standard of living of the people'.

Dr. V.K. R.V. Rao has very aptly put forward in the above brief paragraph the problem which confronts us in India during the post war period. In this chapter I will try to give the role which statistics is to play in the shaping of the country not only in the transition period but also in raising the standard of living of the pre-war Indian people. In order to do so it is necessary that we analyse the economic problems of the

post-war India in slightly greater details than given in the above quotation and then find out how far and in what manner statistics is going to help us.

First let us consider the problems which directly arise due to the termination of war activity. As we have experienced that some activities, which are considered as highly productive during the war, have no value as soon as the peace is declared. That is the reason why ordnance factories producing machine guns, bullets, rifles etc. must stop working at once; the factories which produce tents, parachute silk etc. will also stop working almost at once; then there are certain factories which produce articles like cloth, leather goods, dehydrated vegetables and meat etc. to meet the demands of the army during the war; these factories cannot close down immediately after war but their total production will diminish as the armed forces are gradually demobilised. The rate at which the activities of such industries will end depends on the pace of demobilisation and as soon as demobilisation is complete these factories will totally stop working.

The result of all this is that a number of persons who were engaged in such factories will become unemployed. The unemployment will be immediate in the case of some while in the case of others it will be spread over a given period. To have a smooth and peaceful transition period these persons are to be employed properly. For this it is esssential that a scheme of planning must be adopted by the help of statistics. We must collect statistics of the following.

(a) The number and status of persons who form the armed forces proper including all the men who are directly engaged on army work like construction of roads, bridges etc., for the march of army.

(b) The number and information regarding skill, wages etc. of persons engaged in the factories producing war materials, for example, ordnance factories.

(c) The number and information regarding salary, education etc. of persons who have been increased for office work during the war.

(d) The number and information regarding skill wages etc. of persons engaged in factories which produce articles required by the armed forces to meet their necessities, for example tents,textiles, furniture, crockery and cutlery etc.

(e) The number and status of persons employed in constructional work in the country excluding those working with the army on the front who have been included in (a) above.

Having found out the total number of persons who are to be released from their war time occupations, our duty is to regulate their release so that they at once get some employment. For this it is essential to find out first how many persons can be suitably employed every month. But before we can answer this we must decide as to how these persons are to be provided with employment.

Since our aim is to raise the standard of living of the Indian people,it is essential that all these persons—or at least a large proportion of them—must be employed in activities which produce commodities and articles for the consumption of the people during peace time. Thus we should try to absorb them in productive employment. Considering the case of an industrially backward country like India most of this employment will be provided by a scheme of industrialisation of the country. However as we know that we cannot industrialise a country overnight and a reasonable time must

elapse before the country can start industries and factories afresh. But in the case of post war India though it is undoubtedly necessary that some new industries should be started what is more important from our point of view of providing employment is that many industries, which have either sprung up during the war or which diverted their peace production to the production of war materials, must be reconverted to the form in which they will produce articles for peace time civilian consumption. This all goes to show that the industrialisation during the transition period should be threefold in character:

(1) Restoration of civilian industries: this will include renewing of peace-time schemes of welfare activities like extension of education, sanitation, rural development etc. which might have been stopped or obstructed during the war, starting of building aud other constructional projects, release of factory output like textile, vegetable ghee, cement etc. to the civilian market, rather than closing of these industries, grant of facilities for repairs and maintenance of factories in which these operations were stopped due to war-time controls and allowing the private capitalists to start industries and factories afresh.

(2) Conversion of wartime factories like ordnance factories, factories producing parachute silk, dehydrated meat etc. to those which will produce commodities for peace time consumption.

(3) Starting of new industries and factories and increase in economic activity.

Out of these the third will be restricted to very narrow sphere for the first few years, but the first two measures can easily be adopted within a short time after the termination of war. However to carry

on these schemes successfully it is essential to take the following two steps:—

(1) Creation of Labour-exchanges which will keep an indexed and classified list of all war employees with their qualifications and supply employees to the needy employers who can send details of their requirements.

(2) Establishment of training centres which will properly train the war employees.

For these two steps to be taken successfully it is necessary that a census on the basis of population census, must be carried on to collect information regarding age, sex, occupation, salary etc. Besides these, information must be collected regarding the skill, experience etc. for various professions which the war-employees will prefer when they are released from the present employments. This requires the preparation of a questionnaire or a blank-form—preferably the former—by some experienced economist in consultation with a good statistician. The enquiry may be carried on by the government and the total number of returns must be entrusted to a statistician whose services should be obtained for the purpose. This statistician will study the returns and analyse them for giving information to the effect as to who is to go to which training centre and who are to be entrusted directly to the care of the Labour exchange for the collection of proper work to be provided. A little observation will indicate that the success of the above scheme lies in the accuracy and details of information given in the returns. Undoubtedly, there will be errors due to natural tendency of an average man to exaggerate his qualities or qualifications and try to suppress his inexperience and lack of training for a particular work where skilled labour is required, but such errors can be avoided by telling the informants that wrong answers will debar

him from getting any employment; besides this his friends may also be cross-examined by the enumerator. Such devices will definitely be responsible for obtaining unbiased information from the informants. This will give the statistician all the material he wants and he can fix any pace of releasing the men employed in the different war services. Besides this he can easily give the rate at which the number of these unemployed persons will go to the training centres. However this information alone will not determine the number of persons who can be suitably employed. To determine this the statistician must collect data regarding the condition of industries. Again a questionnaire can be sent in which information regarding the date of start of the industry, the commodities, if any, which were produced before war in it, the number and the type of person it can employ on conversion, the alternative to which it wants to be converted etc. The returns will equip the statistician with information by which he can regulate the rate of release of men from war services. In the case of industries which were not running during the pre-war period and which came into existence during the war the work of the statistician will not be too easy. He will be required to select a proper form to which the industry is to be converted. Now this form cannot be selected easily or haphazardly, for example you cannot change every factory into a textile factory. Besides the difficulty of change in the form or installation of machines etc. there are other informations which the statistician must have at his disposal. He must know whether the factory will be near enough to the raw materials, whether raw-materials will be available, whether the industry selected is the right one and produce commodities which are really in scarcity and not commodities with which the market is already (or will in near future be) flooded, such are the questions and problems which require a lot of planning in the statistical field. Without proper

statistical planning on the lines suggested above it is very difficult to get any satisfactory scheme which will regulate the rate of demobilisation or release of man-power from war-services or occupations. Thus statistical planning is essential not only to make transition period smooth but also to guide the country in the post-war industrial planning of the country.

Another problem which we have to face as a country advances towards industrialisation is that there should be a balanced production of commodities. The idea behind this is that the country should first aim at self-sufficiency as far as industrial production is concerned. We should not produce say cloth in abundance so much so that it must be sent to other countries in enormous quantities while we are exporting say raw jute and importing gunnybags. It is better to curtail the production of cloth and increase the production of gunny-bags. An ideal case has been taken to illustrate the point, however in general there will not be such clear cut cases. It is for the statisticians of the country to determine what amount of a particular commodity is to be produced in the country and when this limit has been reached the energy and the resources must be directed to the production of some other commodity. The calculation of this total or the maximum amount of a particular commodity required for consumption in the country can very easily be determined by the collection of statistics of the consumption of previous years. What is difficult to find is the determination of the total output of the commodity in the country for finding as to how far this maximum has been reached. For this purpose it is necessary to have a coordinated scheme of statisticians. Every industrial town must have the services of a statistician, who will collect all sort of data from the industries of that town and will pass this on to the Director of Industries of the province under whom there will be, besides

other staff, one full time statistician and one economist; these last two will study the data from all the industrial reports for the whole province and despatch that to the central Government Statistician; they will also suggest improvements or alterations in the industries for the province; they must also study the question of wages of labour as determined by a study of the cost of living index numbers for individual industries and also on a provincial basis. The Central Government Statistician will study the data of different provinces and prepare a brief report. His duty will also be to guide the different provinces so that proper improvements, alterations and adjustments are made with a view to create similarity in the nature of statistics and its mode of collection. No difference should be allowed to remain from province to province. All this must run according to a well-planned scheme. This scheme must be implemented immediately by the government. For the United Provinces this scheme can be very easily started quite quickly since every industrial town has a big College or University very near to it. The scheme must be conducted by the help of the teachers of statistics—failing that teachers of economics of the different institutions. Such must be the working of the scheme for this province at least because the tremendous advantage of it lies in the fact that most of these teachers are not only well trained and experienced in the handling of statistical data and information but are also well informed with the existing conditions, economic or otherwise, of the surrounding localities.

We have given above the use of statistics in the most important of the problems with which we have to deal in the post-war economic planning of the country. However there are one or two problems more where statistics is to play a role. These problems will now be dealt with summarily.

During the war various control came into existence There were controls on imports and exports; there were controls on the obtaining of essential goods like iron and steel, coal, cement, building materials etc and also their movements. The control on profits resulted in the fixation of prices of various commodities used by consumers. Now, these controls must go otherwise there will be no encouragement to the expansion of private investment and activity. However, we cannot remove controls all of a sudden from all commodities. The case of each individual commodity must be studied exclusively. If there is reason to believe that the lifting of control from a commodity will not throw it to the black-market, the control can be lifted from it. A little consideration will easily indicate that a commodity will not go to the black-market after the lifting of control if its supply can be so regulated as to meet its demand or at least a major part of it For determining this question Statistics must come to the rescue and we must collect data which will give us the idea of the demand and supply of the commodity. In case the statistical data of supply is low compared to that of demand, there is no justifiication in removing the control from the commodity even if the entire population of the country demands the removal of the controls with one voice. Thus we see that the statistical study must be the deciding factor for the lifting of control from a particular commodity.

Then, there is the problem of the surplus consumer goods, which had been stored for military purposes but were not consumed; they are to be released for the civilian consumption. If the total amount of these stores is dumped in the market of the country all of a sudden there is bound to be a tremendous trouble and disturbance in the economic conditions of the country. Consequently it is essential that this surplus must be

released according to a particular plan. It must be determined by the help of statistics as to what quantity of each article, when released in the civilian market, will not adversely affect the production of that article in the country. This will be determined easily if we have statistics of the demand for and supply of the article in the country. If the total supply (including the rate at which the surplus goods are released) does not exceed the total demand for it and if certain precautions are taken in fixing the prices artificially, imposing restrictions on import of the article from foreign countries and so on there is no reason why there should be any trouble due to this release. But all this requires pre-planning which will be possible only after the study of a lot of statistical information.

Thus we conclude that the part played by Statistics in the post-war period of India is so very important that no proper planning is possible without the help of statistical study. I am convinced that a very important reason why the transition period in India is being unduly prolonged is that the system does not depend on statistical study as outlined above. If it is desired to make this transition period from war economy to peace economy brief, smooth and effective the statistical measures suggested above must be given effect to.

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CHAPTER VIII

Publications

Guide to Current Official Statistics

One of the aims for which the Bowley-Robertson Committee recommended the publication of such a guide was to increase the utility to and the use by the public. However that aim has not been achieved due to a very strange reason which is that generally this publication remains out of print and is not available to the public. Consequently there is no use of this publication to the ordinary people. The Government must see that at no time the book is out of print.

The official statistics is included in this publication and it is good that the compilers have tried to follow the publication of the same name in England as far as its purpose is concerned. The purpose of this Guide is hence:

(1) To direct the enquirer to all current official publications that contain statistics bearing on his subject.

(2) To inform him of the nature of the statistics he will find in the volume to which he is referred i. e, their mode of analysis and the time and place to which they refer.

As far as England is concerned it is sufficient for

the Government to do this but in India where the general public is poor and the research workers cannot publish their work, the responsibility of the Government increases. They should, side by side, publish a similar guide for unofficial statistics. This has become absolutely necessary seeing the increase in the popularity of the subject and the amount of research done by unofficial research workers under the different universities of India.

Regarding other official publications nothing will be said here as the reader can easily find information from the above named guide. However we cannot ignore the mention of the only periodical of its kind on the subject which is being published in India under the name *"Sankhya."*

Sankhya

This magazine is being published regularly under the supervision of the statisticians of the statistical Laboratory, Presidency College, Calcutta. Undoubtedly this magazine is of very great use to the general public and specially to the research workers who are interested in the type of problems which find favour in this magazine. During the recent time the general tendency of the magazine has been to publish articles which are more or less purely mathematical in character and generally of theoretical nature. It also includes under its list of published articles some literature on agricultural field experiments. However it ignores articles which cover economic field.

During my last visit to the Laboratory in 1946 I came to the conclusion that the only reason for this neglect of the application of statistics in the economic field is that the staff consists of a number of good statisticians who have specialised in Mathematics but they have hardly any good economist on their staff. They must appoint one or two more economists on their staff.

Besides this, the "Sankhya" does not give any encouragement to the articles which give only suggestions and directions for research in any particular direction. They only publish the finished product in the form of a complete paper. The result of this is that generally the experienced persons,who have little time to write a complete paper on any problem which comes to their mind, are not able to make it known to the interested research workers through this publication.

If the publishers wish to increase the usefulness of this publication to the public, and specially to the research worker they should adopt the improvements suggested above.

Bulletins of Bureau of Statistics and Economic Research, U.P.

The criticism of one of these bulletins has already been given in an earlier chapter under Agricultural Price Index Numbers.

Mr. J. K. Pande has written under the supervision of Dr. R. B. Gupta a bulletin (No. 4) bearing the title

"Prices of cereals in the United Provinces—how they are determined at various stages."

In the foreword Dr. Gupta writes that detailed enquiries were conducted by Mr. Pande for obtaining necessary information, but nowhere in the bulletin there is any mention of statistics which may have been obtained thus; there are no blank-forms or questionnaires which may have been used. How is the reader to conclude that any enquiry was conducted?

On going through the bulletin one invariably comes to the conclusion that there have been unnecessary repetitions which have resulted in making the bulletin so very lengthy. In my opinion the study has been treated statistically without any proper planning; at too many

places unnecessary statistics has been introduced. It would have been better if only an account of the determination of the price at various stages would have been given. At many places coefficients of correlation have been calculated even when they do not serve any useful purpose. This is the general impression which one gets after reading the bulletin. Now let us examine some of the weaknesses which are at once noticed by a reader.

Firstly nowhere it is mentioned as to what is the aim of this study and how this study helps any body or what is its contribution to the existing statistics in India. No conclusions have been drawn after the study and no suggestions have been made. The reader does not add to his knowledge anything by going through the bulletin. 'Marketing of wheat' gives a better account of all this for India. The only conclusion we can draw is that a parallel study has been attempted for the United Provinces in the bulletin with unnecessary repetitions and an unsuccessful attempt at introducing statistics to the study. The villages for the study were selected in consultation with the district authorities who were also responsible for getting information from the cultivators. The selection thus was on the basis of purposive selection method and not on the more scientific random sample basis. This definitely puts a premium on the accuracy of statistics given in the bulletin. The statistics collected by Government officials in India have various defects which have already been discussed in a previous chapter and all those weaknesses must be associated with the statistics given in this pamphlet.

Wheat has been selected as the only important commodity while the tables which are given in support of this statement definitely show that Rice is an equally important commodity.

In the bulletin on page 7 figures for the export of wheat from the *United Provinces* have been given. No-

where it is mentioned as to how these figures have been obtained. There is no trade barrier between the different provinces of India and hence unless an account of the source of information is given, such figures cannot carry any weight.

A description of how the commodity passes through different persons from the producer to the ultimate consumer is given and it is concluded that the cultivator is being cheated; however in describing the process of fixing the price at every stage the author writes that both the parties (seller and purchaser) have a thorough knowledge of marketing conditions and hence there is no reason to believe that the cultivator can be cheated. Too great emphasis has been placed on the fact that there is always a difference in the prices of the produce sold by the cultivator and the price he pays for the seed. In the bulletin no mention has been made of the following two factors which make the price of the seed higher;—

(1) The seasonal fluctuations in the price of commodity depending on the normal demand and supply conditions.

(2) The good quality of the seed as compared to that of the cultivator's produce which is generally mixed with other low priced grains.

On page 24 a table is given in which we find the prices of wheat in London, Calcutta and Bombay. On the basis of the figures in this table a number of statistical constants have been found out. There is absolutely no need of these constants and they do not give any help to the study and have been added unnecessarily.

In chapter vii an attempt has been made to show that the position of the cultivator is extremely weak as a seller due to various causes including indebtedness, ignorance, illiteracy etc. This indicates that the author is influenced by the preachings of communists who

exaggerate the conditions of the poorer section and hence his mind is biased and the study cannot be taken as an unbiased statistical study. Today none of his arguments developed in this long chapter will convince anybody. Inspite of all these causes which still are to be found in the case of the Indian cultivator, who can deny that during the recent war years enormous profits have been made by the Indian cultivator ? Who can believe today that the Indian cultivator has suffered as seller of his produce due to his ignorance ?

I have given above only a few of the many weaknesses to be found in the bulletin. This is simply to indicate that the government machinery requires a total overhaul as far as its statistical staff is concerned. It is high time that the U.P. Government—now a popular government—should appoint really efficient statisticians in the department and should not depend on pure economists to give them a statistical treatment of any problem whatsoever; it is too much to expect from them.

The Food Statistics of India

A pamphlet bearing this title has been published (in 1946) by the Government of India (Food Department) under the supervision of Dr. V.K.R.V. Rao, M.A. Ph. D. (Cantab). This publication is intended to be of assistance to all who have the welfare of the Indian peoples at heart. In the preface which covers first eight pages, a short general and theoretical discussion about the agricultural statistics in India is given. The main text of the pamphlet consists of a number of tables regarding area under different crops, yield of crops, prices, imports and exports etc. The date given in these tables has been copied from official publications like 'Agricultural Statistics,' 'Season & Crop Reports' etc. A few graphs, bar-diagrams and pie-diagrams have been given at places. The pamphlet covers 182 pages out of which more than two-thirds is filled with tables.

No summary is given at the end or anywhere else; no conclusions are drawn from the study. It is not clear to the reader as to what is the sum total of this fruitless effort. The only thing we can say after going through it is that a lot of time, money and paper has been wasted.

In publications which are intended for wide reading by the public the supervising authority must keep in mind the following points :

1. No unnecessary matter should be given. It is always better and more useful if the study is presented very briefly.
2. The theoretical part should be given more importance. Greater space should be provided for the explanation of tables, their source etc.
3. A summary must be provided at the end of the pamphlet.
4. The contribution of the study must be given at the end of the pamphlet

Without the above modifications a publication cannot have any value for the interested reader. This is why the government publications, in general, have not been widely used and read by the public.

Suggestions to U P Government

Some suggestions to the U. P. Government have already been made during the discussion of the various problems given before. Here I give some more suggestions which could not be included there and which I consider to be extremely important for the development of the science of statistics in general and for improvements in its application to the practical field. As we know that the province has as many as five universities and hence it requires special attention inasmuch as the cooperation of the universities and the Government is

concerned. Hence to improve research work and for the successful working of the statistical investigations in general on the practical side, I give the following suggestions:-

1. *Publication of research papers*

Most colleges and universities in the province are carrying on research work in statistics. This research work, however, is the property of the University and mostly remains unpublished. Besides official research work is being done under the government supervision. To this research work the research workers of the Universities and the colleges have no access and this also remains generally unpublished or it published only in an abridged and unintelligible form so that they are rarely of any use to the research workers who have no right or permission to see the confidential files of the government.

To overcome this difficulty, the provincial Government should see that some sort of publication or magazine is started. This magazine will help in making all the research work under the universities and the government available to the research workers or to anybody else who wants to make use of those. This magazine will also publish any suggestion and ideas of others including the experienced lecturers and Government statisticians. Separate publications will be necessary for the research papers which are considered to be lengthy. This magazine will be published at least once a year in the beginning and more frequently as the work gains momentum.

2. *Cooperation with Universities and teachers in the collection of statistical data and its interpretation.*

Most of the data collected and published by the Government e.g. price quotations, production statistics, agricultural statistics etc., are initially in the hands of inexperienced and untrained persons who have generally little knowledge of the subject. This work could be more

efficiently carried on through the colleges and their lecturers.

In contrast to this let us see the conditions as found in Great Britain and United States, there a large share of the research work in statistics—pure or applied—is conducted by the University Professors. We are all acquainted with the contributions to the research in statistics by Prof. Irving Fisher of the Yale University. His work on Index numbers as on other problems is a guide to the workers in that direction and has an important place in the United States. Then again Dr. A.L. Bowley, Professor of Statistics, University of London has the credit for doing the large amount of useful work in statistics. India is grateful to him for his "A Scheme for an Economic Census of India." Thus it will be of great advantage to the Government if it takes help from the lecturers of the Universities in all statistical work.

There is yet another reason for doing so. Statistics is properly understood by very few people in the province and hence efficient and trained men will not be available in great number during the initial stage of this transition period when the speeding up of the statistical activities in the province is taking place.

Thus my suggestion is that the statistical work of the nature already mentioned should be entrusted to the care of the lecturers knowing statistics in different colleges who will carry it on with the help of the students of that subject.

This scheme will have the advantage of carrying on the work with greater efficiency and less cost as the lecturers can be given some remuneration for their part-time services. The money spent like this will definitely be very little compared to the money spent on a permanent staff employed for the purpose.

3. *Training centres*

Facilities should be provided for the meeting of the different officials and non-officials to come to a central place, say Lucknow, for 15 to 30 days during the summer or any other suitable vacations for fewer days according to circumstances so that they may be able to discuss the different problems which arise during the course of their work. During these days special lectures on the subject can also be arranged and the literature provided to them to polish their knowledge and acquaintance with the uptodate work and recent researches.